DOCUMENT RESUME

ED 275 491 SE 047 182

AUTHOR Holtan, Boyd
TITLE West Virginia Secondary Mathematics Teachers: 1964, 1974, and 1984.
INSTITUTION West Virginia Univ., Morgantown. Coll. of Human Resources and Education.
PUB DATE 86
NOTE 64p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS Educational Research; *Inservice Teacher Education; Mathematics Education; *Mathematics Teachers; Microcomputers; Secondary Education; *Secondary School Mathematics; *Surveys; *Teacher Certification; Teacher Qualifications
IDENTIFIERS *Mathematics Education Research; *West Virginia

ABSTRACT

This report is the third in a series of three studies. It presents findings from a 1984 survey, and relates the findings to surveys in 1964 and 1974 to provide a longitudinal look at secondary school mathematics teachers in West Virginia. Of the 1,100 surveys which were sent in 1984, usable responses were received from 669 persons (61%). Where questions were parallel, comparisons were made over the 10- and 20-year periods usually using a percent of the returned responses for each survey. The chapters in the report consider data on the following topics: teaching experience, levels, and certification; education and training (degrees, institutions, and majors and minors); in-service and continuing education; teaching preferences of secondary mathematics teachers; professional activities (association membership and professional journals read); and microcomputers in West Virginia Schools (use and hardware). Observations and comments conclude the publication. The survey packet is appended. (MNS)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED275491

WEST VIRGINIA SECONDARY MATHEMATICS TEACHERS: 1964, 1974, and 1984

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Boyd Holtan

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

BOYD HOLTAN
WEST VIRGINIA UNIVERSITY
MORGANTOWN, WEST VIRGINIA

1986

SE 047 182

BEST COPY AVAILABLE

WEST VIRGINIA SECONDARY MATHEMATICS
TEACHERS: 1964, 1974, and 1984

Preface i

Tables ii

Figures iv

I. Introduction 1
1. Introduction 1
2. Previous Studies 1
3. The 1984 Secondary Mathematics Teacher Survey . . . 2

II. Teaching Experience, Levels, and Certification 3
1. Experience 3
2. Levels and Certification 7

III. Education and Training 12
1. Degrees 12
2. Institutions 16
3. Majors and Minors 16

IV. In-Service and Continuing Education 22
1. In-Service Activities 22
2. Continuing Education 22

V. Teaching Preferences of Secondary Mathematics Teachers 28

VI. Professional Activities 37
1. Assocation Membership 37
2. Professional Journals 37

VII. Microcomputers in West Virginia Schools 43
1. Microcomputer Use 43
2. Microcomputer Hardware 44

VIII. Observations and Comments 45

REFERENCES 47

APPENDIX - Survey Packet 49

BEST COPY AVAILABLE

PREFACE

This report is really the third part of a series of three studies. It reports a 1984 study, but relates it to two previous studies to provide a longitudinal look at secondary mathematics teachers in West Virginia. Hopefully it will add to the paucity of longitudinal as well as to the body of cross-sectional studies in education.

There are many more relationships that could be made with the three sets of data, but these were chosen as the most pertinent at this time. Waiting for further analysis endangers the currency of the 1984 data.

The style of the tables was chosen to make them easily reproduced for projectuals and the survey category identifications are maintained on some of the tables. The style of the references is adapted to fit the microcomputer that was available.

No summary of survey results is possible without a lot of help. I particularly want to mention Dr. Robert Gabrys of the West Virginia Department of Education, who assisted during the survey duplication and collection. Ernestine Capehart, also of the State Department of Education, provided the names and addresses of the mathematics teachers in West Virginia for the survey. The Curriculum and Instruction Department at West Virginia University, Chairpersons Paul McGhee and Perry Phillips allowed secretarial time for the project. Brenda Kramer, C&I Secretary, spent part of two semesters transferring the data from the questionnaires to the computer. Claudette Caravasos has typed many drafts of the report and other C&I Secretarys were very helpful in constructing the tables. Assistance on the chapter on Education and Training was provided by Steve Creasey. The final report was supported by a grant of $750 from the West Virginia University Foundation under the Faculty Development Grant Program. Finally, I want to recognize and thank Dr. John Paterson who gave of his time to help with the computerization and analysis of the data. His interest, enthusiasm and "behind the scenes" assistance made this report a reality. Having John just down the hall cannot be underestimated in considering the educational research resources at West Virginia University.

B.D.H.

TABLES

1. Total Years of Experience (1984)..... 4
2. Years of Experience (1964, 1974, 1984)..... 5
3. Years Taught in Current School (1984)..... 8
4. Teaching Levels (1964, 1974, 1984) 10
5. Certification (1974, 1984).....11
6. Degrees (1964, 1974, 1984).....13
7. Degrees and Level (1964, 1974, 1984).....14
8. First Baccalaureate Degree and Institution Type (1964, 1974, 1984).17
9. Baccalaureate Degree Institutions and Level (1964, 1974, 1984).....18
10. Institutions Conferring Baccalaureate Degrees (1974, 1984).....19
11. First College Major (1964, 1974, 1984).....20
12. College Minor or Second Major (1964, 1974, 1984).....21
13. In-Service Training (1964, 1974, 1984).....23
14. In-Service Courses or Workshops (1984).....24
15. Credit Since Highest Degree (1964, 1974, 1984).....25
16. Experimental Programs (1964, 1974, 1984).....26
17. Rather Teach Some Other Subject (1964, 1974, 1984).....29
18. Teach Five More Years of Math (1964, 1974, 1984).....30
19. Years of Teaching Math and Plan to Teach Five More Years (1984)....31
20. Plan to Earn Additional Credit and Plan to Teach Five More Years (1984).....32
21. Rather Teach Other Mathematics Courses (1974, 1984).....33
22. Preferred Other Mathematics Courses (1984).....34

23. Taken In-Service Courses and Prefer to Teach Another Mathematics Course (1984).....36

24. Professional Organization Membership (1964, 1974, 1984).....38

25. Professional Journals/Magazines Regularly Read (1984).....39

26. Other Journals/Magazines (1984).....40

27. Type of Journals/Magazines Chosen (1984).....41

FIGURES

1. Total Years of Experience and Years Taught in Current School.. 9

2. Year Baccalaureate Degree Conferred.....15

I. INTRODUCTION

Many committees and panels are attempting to assess the quality of teaching and education in the United States and make improvement suggestions. For example, see reports such as A NATION AT RISK: THE IMPERATIVE FOR EDUCATIONAL REFORM and EDUCATING AMERICANS FOR THE 21st CENTURY. Knowledge of the quality and quantity of teachers is needed to determine current trends and to extrapolate for the future. Past information about teacher training, in-service training, experience, and professional participation are important indicators of trends to assist future decisions.

The quantity of secondary mathematics teachers is increasingly coming to the attention of the public as many reports are predicting an impending severe shortage. House (1982) reports on the coming mathematics teacher shortage by calling them an "endangered species". Wise (1986 p. 649) has concluded that there will be a shortage of all teachers and included a list of supporting references for his beliefs. A special section of the June, 1986, issue of PHI DELTA KAPPAN is dedicated to the teacher shortage. Hawley (1986) discussed consquences of various policies affecting supply and demand of teachers, Haberman (1986) looked at teacher licensing, Watts (1986) questioned what happened in classrooms during a teacher shortage, and Roth (1986) discussed emergency certificates, misassignments, etc. McGeever (1984) discussed the expected national shortage of science and mathematics teachers and presented some of the possible state and local initiatives which might help to alleviate the shortage. Are these predictions also true for West Virginia?

The 1984 West Virginia mathematics teacher study is unique in that it has information on characteristics generally related to both quantity and quality over a twenty year period with measures at the beginning and subsequent ten year periods.

Previous Studies

Extensive information about secondary mathematics teachers in the state of West Virginia has been gathered two times previously. They were reported as dissertations at the Ohio State University in 1965 and at West Virginia University in 1974. They were:

PREPARATION OF THE MATHEMATICS TEACHERS IN THE PUBLIC SECONDARY SCHOOLS OF WEST VIRGINIA by Walter Edwin Regula, the Ohio State University, 1965.

PREPARATION OF THE MATHEMATICS TEACHERS IN THE PUBLIC SECONDAY SCHOOLS OF WEST VIRGINIA by Steven Hunter Hatfield, West Virginia University, 1974.

These two studies provide information about secondary mathematics

teachers in West Virginia in 1964 and 1974 with a number of comparisons pointed out by Hatfield as he used most of Regula's questionnaire items in his 1974 survey.

Although not a study specifically of mathematics teachers, an article in PHI DELTA KAPPAN reported information about teachers over the same 1964-84 period based on surveys in Dade County, Florida, (Kottkamp, etal. 1986) that compared the experience and training of 6,500 Dade County Teachers in 1964 and more than 2,700 Dade County Teachers in 1984. The 1964 surveys were collected by Dan Lortie for his book, SCHOOLTEACHER (Lortie, 1975). The Dade County surveys collected some of the same information as the West Virginia studies and reported results that parallel a number of items. Results will be compared with the West Virginia surveys whenever they are appropriate.

The 1984 Secondary Mathematics Teacher Survey

The late Professor Walter Regula of Marshall University surveyed the educational preparation of 899 West Virginia secondary school mathematics teachers and Dr. Steven Hatfield, now of Marshall University, repeated most portions of the survey with 877 teachers. Hatfield made comparisons between his results and those of Regula from the survey ten years earlier.

In 1984, a survey which included all the items of the Hatfield 1974 survey was mailed to about 1,100 secondary mathematics teachers in West Virginia. (See Appendix A for the survey packet). The names and addresses of the secondary school mathematics teachers were obtained from the West Virginia State Department of Education. In addition to the Hatfield items, some additional questions were included to gather information about the use of microcomputers in the schools.

Arrangements were made with the West Virginia State Department of Education to print the surveys and assist in the return mailing of the questionnaires. Dr. Gabrys of the W.V. State Department was very helpful in coordinating those activities.

Although all of Hatfield's questionnaire items were included in the 1984 survey, there were some items on Regula's 1964 survey which were not on the 1974 or 1984 surveys. A part of Regula's investigation involved the activities of teachers who were teaching with a "mathematics minor of 18 hours" compared to mathematics majors. Between the 1964 and 1974 surveys, state certification standards raised so that training institutions were requiring substantially more than the 18 hours. Therefore, the 1974 and 1984 surveys did not include some of the items from the 1964 survey.

Of the 1,100 surveys which were sent in 1984, useable responses were received from 669 or 61%. Where questions and responses are appropriate, comparisons will be made over the 20 and 10 year periods of the two studies usually using a percent of the returned responses for each survey.

II. TEACHING EXPERIENCE, LEVELS, AND CERTIFICATION

Experience

The total number of years of teaching experience, not including the present year, was the first question on the 1984 survey (Item A-1 on the questionnaire in the Appendix.) Table 1 shows the number and percent of the 669 returns for each of the years. Note that over 56% have more than ten years of teaching experience but that less than 2% were in their second year or less of teaching. Table 2 shows comparable results for years of teaching experience over the 20 year period for the years 1964, 1974, and 1984. (Regula p. 60 and Hatfield p. 33) Note the decrease in percent of beginning teachers (zero years of experience) which was about 10% in 1964 and 1974 but was .2% in 1984. This shows the low number of secondary mathematics teachers who entered the teaching field and points to a problem in providing new teachers to replace retiring teachers. Only 17% of the teachers in 1984 had 5 years or less of experience while 40% and 52% had five years or less of experience in 1964 and 1974.

The percent of experienced teachers has increased during the last ten years. In 1964 and 1974, 29% and 34% of the teachers were in the 6-20 years of experience category, while this was 69% for the 1984 teachers. This suggests that the current teachers have been teaching longer and a number of them will reach retirement age in the near future. This result coupled with the indication of fewer beginning teachers and teachers leaving West Virginia causes alarm about a future shortage of secondary mathematics teachers.

The percent of teachers with more than 20 years of experience is quite low and about the same as in 1974. The decrease from 32% in 1964 to 14% in 1974 was suggested by Hatfield to be due to changes in the retirement program between these years making retirement more appealing. (Hatfield p. 34).

Since the upper categories of years of experience are grouped on the 1984 survey, it is not possible to compute the average number of years of experience for secondary mathematics teachers. However, if the median year is taken for all of the members of each group, that is, for "11-15" use 13, for "16-20" use 18, and for "Over 20" use 23, a useful approximation of the mean may be computed. The computation estimate shows that the average teaching experience of the 1984 secondary mathematics teachers in West Virginia was 12.1 years.

The Dade County, Florida, report indicates similar results of teaching experience for all teaching subjects and levels. (Kottkamp, etal. 1984 p. 560) That report, shows the following:

TABLE 1

A. MATHEMATICS TEACHING

1. TOTAL YEARS OF EXPERIENCE (1984 SURVEY)

YEARS	NUMBER	PER-CENT
0	1	.15
1	12	1.79
2	22	3.29
3	21	3.14
4	19	2.84
5	39	5.83
6	43	6.43
7	46	4.33
8	31	4.63
9	31	4.63
10	48	7.17
11-15	194	29.00
16-20	87	13.00
Over 20	92	13.75
Total	669	

TABLE 2

A. MATHEMATICS TEACHING

1. YEARS OF EXPERIENCE

Years Of Experience	1964 No.	%	1974 No.	%	1984 No.	%
0	89	9.9	91	10.4	1	.2
1-5	268	29.8	362	41.3	113	16.9
6-10	107	11.9	170	19.4	182	27.2
11-20	151	16.8	128	14.6	281	42.0
OVER 20	284	31.6	126	14.4	92	13.8
TOTAL	899		877		669	

	DADE COUNTY SCHOOLS YEAR	
	1964 %	1984 %
TOTAL YEARS TEACHING		
1 year or less	10.5	2.5
2-5 years	23.3	11.8
6-10 years	23.2	18.5
11-15 years	16.2	22.5
16-20 years	9.7	18.9
21-25 years	7.5	12.4
26 years or more	9.5	13.4

These results appear to be very similar to the results for West Virginia as indicated on Tables 1 and 2.

By combining categories in the two studies, it is possible to get the comparisons as shown below:

	Dade County Survey (All Subjects)		West Virginia Survey (Sec. Math Teachers)	
TOTAL YEARS OF TEACHING	1964 %	1984 %	1964 %	1984 %
5 years of less	33.8	14.3	39.7	17.1
6-10 years	23.2	18.5	11.9	27.2
11-20 years	25.9	41.4	16.8	42.0
Over 20 years	17.0	25.8	31.6	13.8

A comparison of these figures indicates that the potential for a teacher shortage in Dade County, Florida, is very severe. In 1984 Dade County had more than one-fourth of its teachers with over 20 years of experience. This is greater than West Virginia mathematics teachers with 13.8% having over 20 years of teaching experience. Both Dade County and West Virginia have a problem with younger teachers, since less than 18% have five years or less of experience. West Virginia has been more successful with 44.3% of its teachers having ten years or less of experience. Since the West Virginia percentage of secondary mathematics teachers with more than twenty years of experience is noticeably less than in Dade County, it may be conjectured that some West Virginia secondary mathematics teachers teach for some years and then change to non-teaching vocations or move to another state. The larger percentage of teachers in the 6-10 year experience category also supports this conjecture. Further analysis of this conjecture may also be found in the later section of this report on teacher preferences.

The decrease in the "Over 20 years" category from 1964 to 1984 for West Virginia also reflects a change in the retirement options as reported by Hatfield as mentioned earlier.

These data suggest that in West Virginia, unlike Dade County, where a serious teacher shortage is immenent due to teacher retirements, the shortage of mathematics teachers will result both from teachers leaving teaching and from retirement. West Virginia appears to be losing its young but experienced teachers. One of the recent popular notions, "teacher burnout" may be a reason. Other reasons may include the lower salaries and discouraging working and professional conditions in West Virginia.

Although teacher education institutions in West Virginia are often criticized in the state, their products have a good reputation in other states. West Virginia mathematics teachers, especially experienced and in their prime, are welcomed in many other states. Thus the mathematics teacher shortage in West Virginia may be blunted if actions were taken to hold these teachers for a longer career in the state.

The number of years taught in the school where they are now teaching (current school) is reported in Table 3. The average number of years teaching in the current school is 8.1 years. The indication of a mature teaching faculty is indicated by the more than 30% who have been in the same school more than ten years.

A graph of the total years of experience and years in the current school is shown in Figure 1. The graph indicates that beginning secondary mathematics teachers move from school to school, but after the sixth year tend to stay in the same school.

Levels and Certification

The teaching level of mathematics teachers over the twenty year period 1964-84 is shown in Table 4. (Regula p. 60, Hatfield p. 33) The 1984 data reports Middle School while the earlier surveys include Jr.-Sr. High School. Although the teaching level categories have changed from 1974 to 1984 with the growth of the "Middle School," it appears that the proportions have remained fairly constant. If the earlier category of Jr.-Sr. High School is split into Jr. High School and High School and added to these categories with some of the Jr. High School identifying with the Middle School, the proportions are about the same.

The West Virginia State Certification of the secondary mathematics teachers is shown in Table 5. Comparable data for 1974 was also available and is shown in the table (Hatfield, p. 35).

A large proportion (62.3%) of the 1984 teachers hold the Permanent Professional Certificate. This compares with 29.1% in 1974. Also note the decrease in Provisional Certificates in 1984. This data indicates that the teachers have completed their provisional activities and are a mature teaching group.

TABLE 3

A. MATHEMATICS TEACHING

2. YEARS TAUGHT IN CURRENT SCHOOL (1984)

YEARS	NUMBER	PER-CENT
0	14	2.09
1	51	7.62
2	57	8.52
3	55	8.22
4	55	8.22
5	51	7.62
6	38	5.68
7	46	6.88
8	34	5.08
9	28	4.19
10	34	5.08
11-15	127	18.98
16-20	56	8.31
Over 20	22	3.29
Omit	1	.15
Total	669	

FIGURE 1

A. 1 and 2

TOTAL YEARS of EXPERIENCE AND

YEARS TAUGHT in CURRENT SCHOOL

(1984 Survey) N= 669

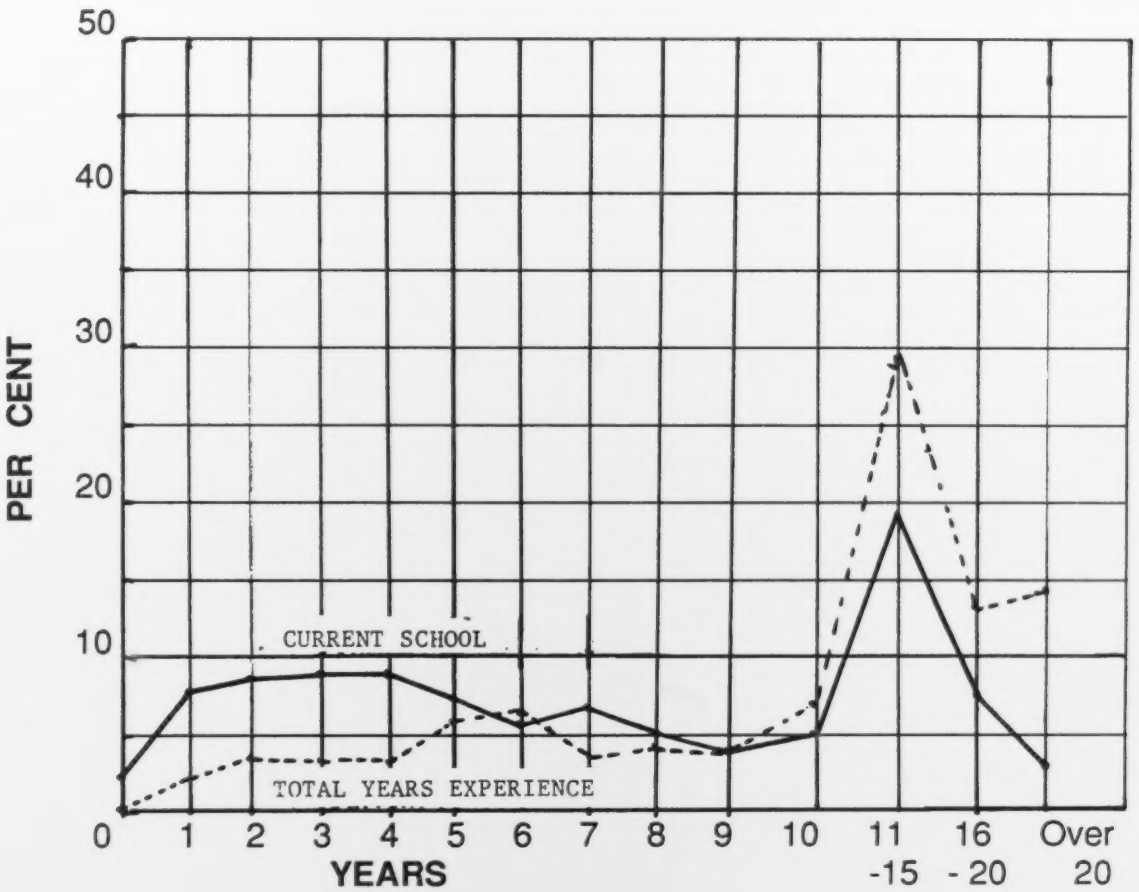


TABLE 4

B. TEACHING LEVEL

	1964		1974		1984	
	No.	%	No.	%	No.	%
MIDDLE SCHOOL	----	----	----	----	100	14.6
JUNIOR HIGH SCHOOL	324	36.0	354	40.4	251	37.5
JR-SR HIGH SCHOOL	352	39.2	249	28.4	----	----
SENIOR HIGH SCHOOL	223	24.8	274	31.2	318	47.5
TOTAL	899		877		669	

TABLE 5

C. CERTIFICATION

	1974		1984	
	No.	%[1]	No.	%[2]
One Year Permit	20	2.3	9	1.3
Provisional Professional	307	35.0	72	10.8
Professional	238	27.1	205	30.6
Professional Permanent	255	29.1	417	62.3
Administration[3]	42	4.8	56	8.4

1. Percentage based on the 877 respondents.
2. Percentage based on the 669 respondents.
3. Some may have multiple certification.

III. EDUCATION AND TRAINING

Degrees

Nearly all of the secondary mathematics teachers in the 1984 survey held the baccalaureate degree as shown in Table 6. The 97.2% does not include the ten who reported a Master's Degree and didn't indicate a baccalaureate degree. One could assume they had a baccalaureate and did not report it which would increase the ratio to 98.7%. This total also does not include the second baccalaureate degree reported by 19 teachers. In 1974, all teachers held the baccalaurate degree and there were only sixteen in 1964 who didn't. The advanced degree increases are noticable, however. In 1964 and 1974 34% and 32% held Master's Degrees (Regula p. 88 and Hatfield p. 40). This raised to 54% in 1984 with some reporting degrees beyond the level. Thus, the 1984 mathematics teachers appear to have completed an increased number of advanced degrees and should be a stronger group professionally. The question of whether the advanced degrees are related to the school administration level of teaching is shown in Table 7. The percentages for the degrees are based on the number of respondents in that level and year. In 1984, 43% of the Middle School teachers, 50.2% of the Junior High School and 60.7% of the Senior High School teachers held the Master's Degree. The advanced degrees do not appear to be specifically related to teaching level. The very few degrees beyond the Master's Degree are usually at the Senior High School level.

The year that the baccalaureate degree was conferred in the 1984 survey is shown in Figure 2. The graph shows that the peak was around 1970. This supports the assumption that the current teachers are an experienced and mature group. Also note the fewer number of teachers who received their degrees during the 1980-1985 period. If one were to add 25 years to each of these graduation years, it could represent a picture of the retirements in the mid 1990's.

Comparison of Degrees With Dade County Study

The formal education of Dade County Teachers was reported by Kottkamp, et al. (1986 p. 561, Table 3). A table may be constructed to compare the Dade County and the West Virginia results as follows:

	Dade County Survey All Subjects		West Virginia Survey Secondary Mathematics	
	1964 %	1984 %	1964 %	1984 %
Bachelor's Degree	99.6	100.0	98.2	97.2
Master's Degree	28.4	57.5	--	55.0
Doctor's Degree	.4	1.4	--	.6

The West Virginia secondary mathematics teachers and the Dade County teachers appear to be very similar in the amount of formal education. Most have the baccalaureate degree and a little over half of the teachers hold

TABLE 6

E. EDUCATION AND TRAINING

2. DEGREES

	1964		1974		1984	
	No.	%[1]	No.	%[1]	No.	%[1]
Bachelor's Degree	883	98.2	877	100.0	650[2]	97.2
Master's Degree	306	34.0	281	32.0	362	54.1
Master's Plus 30 Hours					6	.9
Ed.D.					2	.3
Ph.D.					2	.3
Total	899	100.0	877	100.0	669	100.0

[1]Based on the total for the year.

[2]Ten indicated Master's Degree and no Baccalaureate Degree.
Nine did not respond to the item.
Nineteen reported two Baccalaureate Degrees.

TABLE 7

DEGREES OF SECONDARY MATHEMATICS TEACHERS BY LEVEL

		Middle School		Junior High School		Jr-Sr High School		Senior High School		Total	
Number in Level and Percent	1964			324	36.0	352	39.2	223	24.8	899	100.0
	1974			354	40.4	249	28.4	274	31.2	877	100.0
	1984	100	14.9	251	37.5			318	47.5	669	100.0
		No.	%[1]	No.	%[1]	No.	%[1]	No.	%[1]	No.	%
Bachelor's Degree	1964			317	97.8	344	97.7	222	99.6	883	98.2
	1974			354	100.0	249	100.0	274	100.0	877	100.0
	1984	100	100.0	240[2]	95.6			310[2]	97.5	650[2,3]	97.2
Master's Degree	1964			103	31.8	105	29.8	98	43.9	306	34.0
	1974			94	26.6	80	32.1	107	39.0	281	32.0
	1984	43	43.0	126	50.2			193	60.7	362	54.1
Master's Plus 30 Hours	1984	1	1.0	1	.4			4	1.3	6	.9
EdD	1984							2	.6	2	.3
PhD	1984							2	.6	2	.3

[1]Per cent of that level.

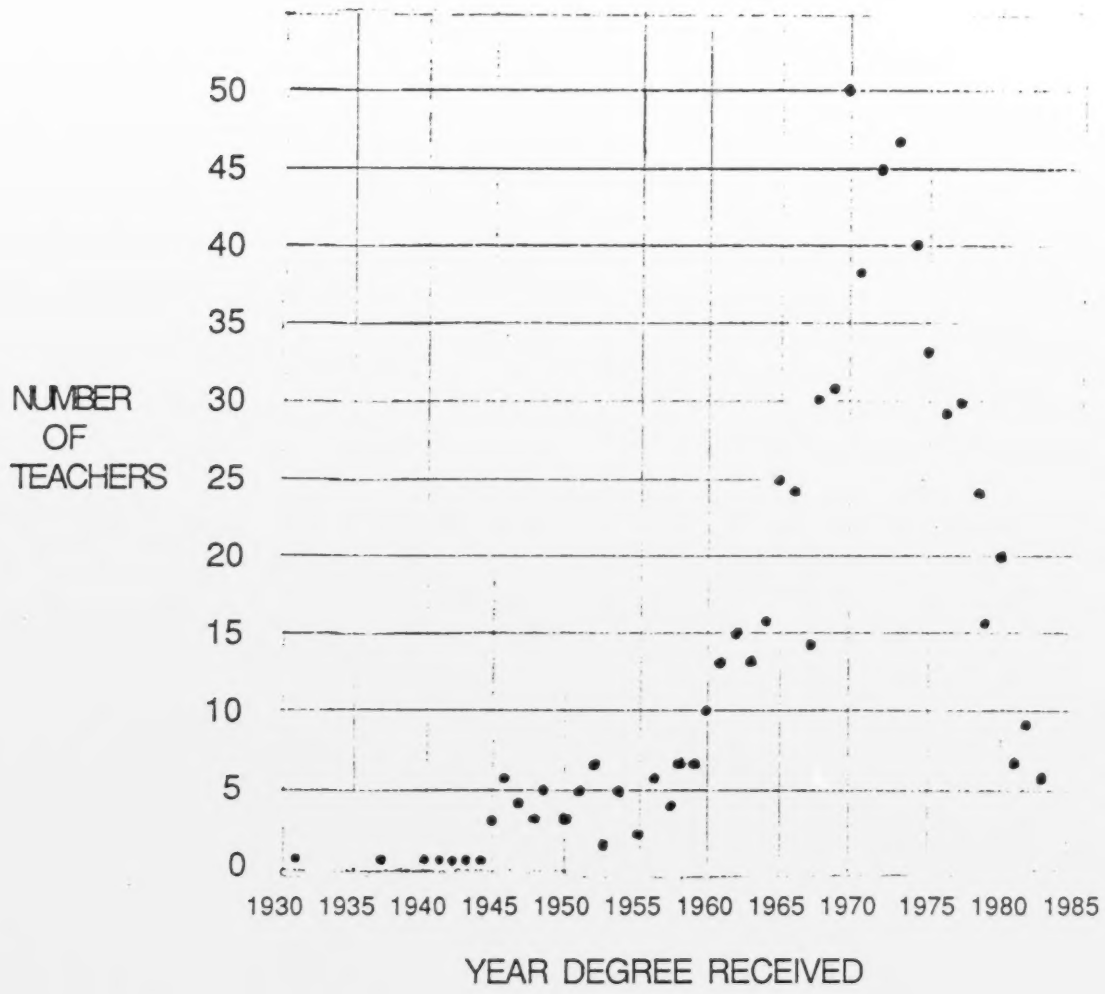
[2]Six Junior High and four Senior High School Teachers indicated Master's Degree and no Baccalaureate Degree.
Nine Junior High and four Senior High School Teachers did not respond to the item.

[3]Nineteen of the 650 reported two Baccalaureate Degrees.

FIGURE 2

E. DEGREES (1984 Summary)

1. YEAR BACCALAUREATE DEGREE CONFERRED



degrees beyond the baccalaureate.

Institutions

Secondary school mathematics teachers received their baccalaureate degrees from the same types of higher education institutions in 1974 and 1984. Table 8 shows that about 60 to 70% received the first degree from a West Virginia state college or university. About 12% received degrees from West Virginia independent colleges and about 15% of the degrees were from out of state institutions. The only noticeable change over the twenty year period is a slight decrease in the West Virginia independent college degrees since 1964, from 20% to about 12%.

The school level of the graduates of the different types of colleges has remained about the same over the twenty year period as shown in Table 9. The apparent increase in Senior High School teachers in 1984 is probably due to not using the Jr.-Sr. High School category and the inclusion of the Middle School in the survey.

The institutions who awarded the degrees are shown on Table 10. The 1964 report included this information, but the institutions are identified by letters and individual identification was not possible. The number of baccalaureate degrees received from the institutions is surprisingly similar for the 1974 and 1984 surveys.

Majors and Minors

The college major and minor or second major is reported in Tables 11 and 12 for the 1964, 1974, 1984 surveys. (Regula p.73 and Hatfield p. 36). The proportion that majored in mathematics in 1974 and 1984 was about 60% for both years. This was an increase over the 41.9% in 1964. However, the 1964 teachers had a larger proportion that majored in science, 17.9%, but were teaching mathematics. The number of science majors teaching mathematics dropped each of the 1974 and 1984 years, and was only 6.1% in 1984. Mathematics teachers with other majors appear to have decreased after the 1964 results. The 1974 and 1984 results appear to be similar in this regard with the possible exception of those trained in elementary education. The 1984 survey indicated that 9.3% listed elementary education as their major. This is possibly due to the change in school districts in West Virginia adopting the Middle School organization.

The college minor or second major indicates in Table 12, that science is decreasing as a supporting area for secondary mathematics teachers. In 1964, 22.4% and in 1974, 19.6% chose science as a second area while in 1984 it was down to 14.1%. This is probably due to the emphasis on comprehensive programs in mathematics and to the other college requirements in general education and teacher education that discourage the extra time needed to complete additional science courses.

TABLE 8

FIRST BACCALAUREATE DEGREE INSTITUTION TYPES

Year	WV State Institutions		WV Independent Institutions		Out of WV Institutions		No Response		Total	
	N	%	N	%	N	%	N	%	N	%
1964	549	61.1	185	20.6	147	16.4	18	2.0	899	100.0
1974	622	70.9	103	11.7	129	14.7	23	2.6	877	100.0
1984	465	69.5	82	12.3	103	15.4	19[1]	2.8	699	100.0

[1]Ten indicated Master's Degree and no Baccalaureate Degree.
Nine did not respond to the item.

TABLE 9

BACCALAUREATE DEGREES
INSTITUTION BY TEACHING LEVEL

	Year	Middle School		Junior High School		Jr-Sr High School		Senior High School		Total	
Number in Level and Percent	1964	-	-	324	36.0	352	39.2	223	24.8	899	100
	1974	-	-	354	40.3	249	28.4	274	31.2	877	100
	1984	100	14.9	251	37.5	-	-	320	47.8	669	100
Institution Type		N	%[1]	N	%[1]	N	%[1]	N	%[1]	N	%
WV State Institutions	1964	-	-	192	35.0	208	37.9	149	27.1	549	61.1
	1974	-	-	244	39.2	169	27.1	209	33.6	622	70.9
	1984	75	16.1	177	38.0	-	-	213	45.8	465	69.5
WV Independent Colleges	1964	-	-	75	40.5	68	36.8	42	22.7	185	20.6
	1974	-	-	50	48.5	19	18.4	34	33.0	103	11.7
	1984	10	12.1	30	36.6	-	-	42	51.2	82	12.3
Out of WV Institutions	1964	-	-	48	32.7	68	46.3	31	21.1	147	16.4
	1974	-	-	54	41.9	47	36.4	28	21.7	129	14.7
	1984	15	14.6	33	32.0	-	-	55	53.4	103	15.4
No Response	1964	-	-	9	50.0	8	44.4	1	5.5	18	2.0
	1974	-	-	6	26.0	14	60.9	3	13.0	23	2.6
	1984	0	0.0	11	57.9	-	-	8	42.1	19[2]	2.8

[1]Percentage based on year and total for institution type.
[2]Ten no response Baccalaureate Degree Teachers reported Master's Degrees.

TABLE 10

INSTITUTIONS CONFERRING BACCALAUREATE DEGREES

Institutions	1964 N	1964 %	1974 N	1974 %	1984 N	1984 %
WVU	-	-	97	11.1	89	13.1
Marshall	-	-	122	13.9	80	11.8
WV State College	-	-	40	4.5	31	4.6
WV Tech.	-	-	50	5.7	39	5.7
Bluefield State	-	-	15	1.7	9	1.3
Concord	-	-	94	10.7	59	8.7
West Liberty	-	-	36	4.1	29	4.3
Shepherd	-	-	41	4.7	31	4.6
Glenville	-	-	75	8.6	64	9.6
Fairmont	-	-	52	5.9	33	4.9
Wheeling College	-	-	0	0.0	1	0.1
U.C. (Morris Harvey)	-	-	39	4.4	19	2.8
Salem	-	-	30	3.4	28	4.0
Bethany	-	-	2	0.2	5	0.7
Alderson Broaddus	-	-	8	0.9	7	1.0
WV Wesleyan	-	-	14	1.6	11	1.6
Davis & Elkins	-	-	10	1.1	12	1.8
Total West Virginia	734	81.6	725	82.7	547	81.8
Outside WV	147	16.4	129	14.7	103	15.4
No Response	18	2	23	2.6	9	1.3
Reported Master's Only					10	1.5
Total	889	100	877	100	669	100

TABLE 11

E. DEGREES AND PROGRAM
2. FIRST COLLEGE MAJOR INDICATED

	1964		1974		1984	
	No.	%[1]	No.	%[2]	No.	%
Mathematics	370	41.9	557	63.5	402	60.1
Science	156	17.7	84	9.7	41	6.1
Soc. Studies	85	9.6	21	2.4	26	3.9
Language	64	7.2	42	4.8	17	2.5
Business	69	7.8	----	----	11	1.6
Phys. Ed.	46	5.2	48	5.5	37	5.5
Voc. Arts	42	4.8	----	----	2	.3
Fine Arts	9	1.0	----	----	3	.4
Elementary	40	4.5	32	3.6	62	9.3
Education (Gen.)	----	----	----	----	42	6.3
Other	2	.2	42	3.6	11	1.6
No Response	0	0	50	5.7	17	2.5
Total	883		887		669	

1. Percentage based on number of respondents who had earned bachelor's degree.
2. Percentage based on total number of respondents.

TABLE 12

E. DEGREES AND PROGRAM
3. COLLEGE MINOR OR SECOND MAJOR

	1964		1974		1984	
	No.	%[1]	No.	%[2]	No.	%[2]
Mathematics	239	27.1	189	21.6	162	24.2
Science	198	22.4	172	19.6	94	14.1
Soc. Studies	147	16.6	64	7.3	45	6.6
Language	103	11.7	86	9.8	62	9.3
Business	17	1.9	----	----	8	1.2
Phys. Ed.	24	2.7	22	2.5	21	3.1
Voc. Arts	4	.5	----	----	1	.1
Fine Arts	7	.8	----	----	2	.3
Elementary	8	.9	----	----	3	.4
Education (Gen.)	----	----	----	----	28	4.2
Other	8	.9	39	4.4	21	3.1
No Response[3]	128	14.5	305	34.8	221	33.0
Total	883		887		669	

1. Percentage based on number of respondents who held bachelor's degrees.
2. Percentage based on total number of respondents.
3. Size may be due to no second field in comprehensive math program.

IV. IN-SERVICE AND CONTINUING EDUCATION

In-Service Activities

The secondary mathematics teachers in West Virginia have continued to participate extensively in in-service training activities. Table 13 shows responses related to in-service training. Nearly 60% have taken a course or workshop for mathematics teachers during the past five years. Interest in National Science Foundation or sponsored summer or academic year programs has been high with 27% reporting that they had applied for and 28% indicating that they have attended a sponsored program. These percentages were lower than 1974, but that would be expected with the greater amount of Federal money available at that time. The interest in professional improvement is indicated by the 47% who plan to earn additional credit in the next five years with 35% stating that they are required to earn additional credit. Mathematics teachers participated in a wide variety of in-service activities as shown in Table 14. Even on this wide ranging list, it is noticeable that a large number of the in-service activities are related to or support the teaching of mathematics.

Continuing Education

An indication of continuing education in the 1984 survey is the 85% who have taken college courses since receiving their degrees reported below:

	Number	%
Taken Courses	570	85.2
Not Taken Courses	94	14.1
Omit	5	.7
Total	669	100.0

The amount of college credit since receiving their highest degree is indicated in Table 15. In the 1984 report, 86% had completed at least one semester hour of college credit since receiving the highest degree, with over 62% having completed more than 14 semester hours. The percent in 1984 was an increase over the hours reported in 1964 and 1974. This probably is related to the increased maturity, experience, and service of the 1984 teachers.

Experimental Programs

A large number of secondary mathematics teachers reported that they were knowledgeable of experimental mathematics programs. The responses to "know about" and "use" experimental programs is reported in Table 16 for each of the years 1964, 1974, and 1984 for the major mathematics experimental programs. Since most of the programs were being tried during the "modern mathematics" era, it would be expected that the 1964 and 1974

TABLE 13

G. IN-SERVICE TRAINING

	1964		1974		1984	
	No.	%	No.	%	No.	%
1. Applied for NSF or Sponsored Summer or Academic Year Program	388	43.1		~ 44	179	26.8
2. Attended Sponsored Summer or Academic Year Program	227	25.3	351	40.0	191	28.6
3. Taken Course or Workshop During Past Five Years	385	42.8	601	68.5	400	59.8
4. Required or Need to Earn Additional College Credit in Next Five Years	383	42.6	488	55.6	235	35.1
5. Planning to Earn Additional Credit in Mathematics or Mathematics Education in the Next Five Years	626	69.6	475	54.1	316	47.2
Number of Respondents	889		877		669	

TABLE 14

G. IN-SERVICE TRAINING

3A. Which courses or workshops?

Computers
WVCTM Annual Meeting
Math In-Service
Problem Solving
Finger Math Workshop
Math for Gifted Students
Diagnostic-Prescriptive Math
Math Field Day Training
Metric
Woodn' Metric
STAMM Preparation
County Coord. Math Meeting
Acceleration
Middle School Authorization Class
County Continuing Ed.
Middle School Mathematics
Health Textbook Orientation
Elementary Math
Textbook Orientation
Math Structure
"Raspberry Pie"
Computer Literacy
AVA
WVVA
NCTM
PVCTM
Math Learning Outcomes
WVA Higher Ed. Conf.
RESA
Adv. Placement Calculus
Paper Folding in Geometry
CANT
Basic Skills Sum. Wkshp.
Teaching Concepts
Math Content

TABLE 15

F. WORK BEYOND HIGHEST DEGREE

2. CREDIT HOURS SINCE RECEIVING HIGHEST DEGREE

Semester Hours	1964 Regula, P. 88 No.	%	1974 Hatfield, P. 40 No.	%	1984 No.	%
1-14	332	36.9	316	36.0	160	23.9
Over 14	315	35.0	371	42.3	418	62.5
Total	647	72.0	687	78.3	578	86.4
Respondents	899		877		669	

TABLE 16

I. EXPERIMENTAL PROGRAMS

		KNOW ABOUT NO.	%	USE NO.	%	TOTAL NO.	%
SMSG	1964	375	41.7	154	17.1	529	58.8
(School Mathematics	1974	486	55.3	67	7.6	552	62.9
Study Group)	1984	272	40.7	19	2.8	291	43.5
UICSM	1964	228	25.4	22	2.5	250	27.8
(University of Illinois	1974	249	28.4	10	1.1	259	29.5
Committee on School	1984	115	17.2	2	.3	117	17.5
Mathematics)							
UMMaP	1964	193	21.5	13	1.5	206	22.9
(University of Maryland	1974	145	16.5	7	.7	152	17.2
Mathematics Program)	1984	63	9.4	4	.6	67	10.0
BSTCMP	1964	136	15.1	20	2.2	156	17.4
(Ball State Teachers	1974	85	9.7	3	.3	88	10.0
College Program)	1984	47	7.0	5	.7	52	7.8
TEMAC	1964	178	19.8	53	5.9	231	25.7
(Encyclopedia Brittanica	1974	168	19.1	30	3.4	198	22.5
Programmed Material)	1984	83	12.4	8	1.2	91	13.6
CUSP	1974	42	4.8	3	.3	45	5.1
(Boston College Mathe-	1984	25	3.7	4	.6	29	4.3
matical Series C0-op							
Unit Study Program)							
CUP	1974	39	4.4	3	.3	42	4.7
(Columbia University	1984	28	4.2	3	.5	31	4.6
Project)							
CEMREL	1984	68	10.1	6	.9	74	11.1
(Comprehensive School							
Mathematics Program)							
STAMM	1984	58	8.7	24	3.6	82	12.3
(Systematic Teaching and							
Measuring Mathematics)							
OTHERS	1964	65	7.2	23	2.6	88	9.8
	1974			12	1.4		
	1984	9	1.3	8	1.2	17	2.5
NUMBER OF RESPONSES	1964						899
	1974						877
	1984						669

Multiple responses disregarded. "Use" takes precedent over "know about".

teachers would be aware of them. However, the number of 1984 teachers who are aware of them is surprisingly high. A total of 84 teachers (12.6%) reported using experimental programs in 1984. This is a higher use than was expected since most of the projects had been completed some years ago. The two more current projects, CEMREL (.9%) and STAMM (3.6%), were being used by a some teachers. About 8% of the 1984 teachers reported that they had specific training to use the materials as indicated below.

TRAINING TO TEACH EXPERIMENTAL PROGRAM MATERIALS	NUMBER	%
Yes	52	7.8
No or Omit	617	92.2
Total	669	100.0

The teachers indicated the following types of training received:

NUMBER	
21	NSF Summer or Academic Year Course on Seminar
14	Regular College Classes
9	In-Service Workshops
2	Institution-Sponsored Training Programs
6	Other

Thus 52 of the 83 who are using experimental projects have had special training in the teaching of that material. Again, there appears to be evidence that the secondary mathematics teachers take advantage of training opportunities.

V. TEACHING PREFERENCES OF SECONDARY MATHEMATICS TEACHERS

Satisfaction of the teachers with teaching mathematics rather than other subjects appears to be increasing over the twenty year period. Table 17 reports responses to an item asking if they would rather teach some other subject than mathematics. There were only 10% who would rather teach some other subject than mathematics while in 1964 and 1974 there were 22% and 14%. This is probably an indication of the professional stability of the 1984 group as they appear to be quite satisfied with the subject they are teaching.

The response to the question, "Do you plan to continue to teach mathematics for at least five more years?" was very interesting. The response in 1984 on Table 18 shows 82.4% intend to teach five more years of math, while it was 64.3% and 74.8% in 1964 and 1974. Thus it appears that the mathematics teacher shortage in West Virginia may be expected to peak a bit later than suggested by the Dade County area study as the West Virginia teachers planned to teach at least five more years after 1984. However, they did not state that they would be teaching in West Virginia, so there is still the possibility of not being available for West Virginia classrooms.

When looking at the 82% result, the question arose as to whether these were experienced or beginning teachers who were responding to the "five-more-years" item. Table 19 shows the frequency and percent of each of the years of experience category for this item. The 14.5% who indicated that they would not teach five more years was spread over the experience range rather evenly. The percent for no group appears to stand out. The middle experience categories, 6-10 years and 11-15 years had the larger frequencies and make up more than half of the teachers who plan to continue. Another interesting fact is that of the 8.5% of the teachers with over 20 years of experience, nearly 60% of them expect to teach at least five more years.

These results are encouraging for the current time in West Virginia, but when coupled with the very low number of young teachers and the large number of mathematics teachers who received degrees around 1970, we can expect a serious shortage to hit in the 1990's. Teachers leaving to teach in other states will increase the problem.

During the data analysis, a question was raised on the relationship between plans to teach five more years and plans to earn additional mathematics or mathematics education credits in the next five years. Table 20 presents the data. The professional commitment of teachers is again indicated by the 42.3% who plan more courses.

Unfortunately, 34.5% plan to continue teaching but do not plan additional credit.

When mathematics teachers were asked if they would rather teach other mathematics courses, the responses that they preferred other courses was high in both the 1974 and 1984 data. With 52.3% and 42.8% in Table 21 for these years. Even though the 1984 response is a decrease, it is still a large amount. A possible reason for of this appears in Table 22 where teachers were asked to list the courses they would rather teach.

TABLE 17

H. TEACHING PREFERENCE OF MATHEMATICS TEACHERS

1. RATHER TEACH SOME OTHER SUBJECT

	1964		1974		1984	
	No.	%	No.	%	No.	%
Yes	198	22.0	122	13.9	68	10.1
No	654	72.8	755	86.1	592	88.5
Omit	47	5.2	----	----	9	1.3
Total	899		877		669	

TABLE 18

H. TEACHING PREFERENCE OF MATHEMATICS TEACHERS

2. TEACH FIVE MORE YEARS OF MATH

	1964		1974		1984	
	No.	%	No.	%	No.	%
Yes	578	64.3	656	74.8	551	82.4
No	240	26.7	174	19.8	97	14.5
Omit	81	9.0	47	5.4	21	3.1
Total	899		877		669	

TABLE 19

(H-2)
Do you plan to continue to teach mathematics for at least five more years?

(A-1)
Years of Mathematics Teaching Experience

Freq. Percent	No.	Yes	Omit	Total
0	0 0	1 .2	0 0	1 .2
1-5	15 2.2	93 13.9	5 .7	113 16.9
6-10	22 3.3	152 22.7	8 1.2	182 27.2
11-15	15 2.2	174 26.0	5 .8	194 29.0
16-20	12 1.8	74 11.1	1 .2	87 13.0
Over 20	33 4.9	57 8.5	2 .3	92 13.8
Total	97 14.5	551 82.4	21 3.1	669 100

TABLE 20

(G-5)
Are you planning to earn additional credit in mathematics or mathematics education in the next five years?

(H-2)
Do you plan to continue to teach mathematics for at least five more years?

Freq. Percent	No	Yes	Omit	Total
No	68 10.2	231 34.5	5 .8	304 45.4
Yes	23 3.4	282 42.3	11 1.6	316 47.2
Omit	6 .9	38 5.7	5 .8	49 7.3
Total	97 14.5	551 82.4	21 3.1	669 100.0

TABLE 21

H. TEACHING PREFERENCE OF MATHEMATICS TEACHERS

3. RATHER TEACH OTHER MATHEMATICS COURSES

	1964		1974		1984	
	No.	%	No.	%	No.	%
Yes	----	----	459	52.3	286	42.8
No	----	----	405	46.1	372	55.6
Omit	----	----	12	1.4	11	1.6
Total	----		877		669	

TABLE 22

H. TEACHING PREFERENCE OF MATHEMATICS TEACHERS (1984)

3. A. Other Mathematics Courses

Course	No.	%[1]
General Mathematics	2	.3
Remedial Math	1	.1
Higher J.H.S. Math	3	.4
Pre Algebra	5	.7
Algebra	62	9.3
Algebra & Geometry	31	4.6
Geometry	22	3.3
Algebra II (Alg. Trig.)	41	6.1
Trigonometry	8	1.2
Higher H.S. Math (Trig., Geom., Alg. II, Calc.)	61	9.1
Computers	24	3.6
Trig. and Computers	2	.3
Computers and Pre Calculus	2	.3
Pre Calculus or Math Analysis	6	.9
Introductory Calculus	5	.7
College Level	3	.4

1. The per cent calculation is based on the total of 669 responses.

Observation of the list indicates the desire to teach advanced or college preparatory courses rather than the general mathematics or remedial mathematics. The lower level mathematics classes are often larger and thought to be more difficult to teach. Therefore, the desire to teach college preparatory courses is not surprising. Possibly it might be helpful to keep the size of the lower levels of mathematics classes smaller and even consider the difficulty in teaching them when planning differential staffing.

A question was raised during analysis that if teachers want to teach another mathematics course, have they prepared by taking any in-service courses or workshops for mathematics teachers? Table 23 shows the responses for these categories. 27.2% of the respondents indicated that they wanted to teach another mathematics course and also had completed in-service work. Only 13.9% of the respondents indicated that they wanted to teach other mathematics courses but had not done any in-service work. It appears that those who want to teach higher level mathematics classes were concerned about additional preparation to do it.

The preferences of the mathematics teachers indicate that a large proportion plan to teach at least five years more but with the low number of new teachers, a serious shortage may be expected in the 1990's. Most teachers are satisfied with teaching mathematics, but a number would like to teach courses at a higher mathematical level. A number who do desire to teach at a higher level have done some study to prepare themselves.

TABLE 23

(H-3)
Would you prefer to teach another mathematics course?

(G-3)
Have you taken any in-service course or attended a workshop for mathematics teachers during the past five years?

Freq. Percent	No	Yes	Omit	Total
No	152 22.7	93 13.9	4 .6	249 37.2
Yes	212 31.7	182 27.2	6 .9	400 59.8
Omit	8	11 1.6	1	20
Total	372 55.6	286 42.8	11 1.64	669 100.0

VI. PROFESSIONAL ACTIVITIES

Association Membership

A possible indicator of quality of mathematics teachers is the participation and interest in activities of their profession. Membership in professional organizations is one of these indicators. Table 24 shows the number and percent of respondents who were members of some of the professional organizations over the twenty year period. Membership in the West Virginia Education Association (WVEA) by secondary mathematics teachers was highest in 1964 with over 87% membership. This dropped into the 60's during 1974 and 1984, but is still a high proportion of teacher membership. The National Education Association membership has also decreased over the twenty-year period from 83.5% to 64.3%. This does not reflect membership in other education groups such as the American Federation of Teachers and Classroom Teachers Associations.

Mathematics related associations have held steady. The National Council of Teachers of Mathematics (NCTM) memberships ranged from 17% to 23% over the twenty year measure points. The West Virginia Council of Teachers of Mathematics (WVCTM) was not an active organization in 1964, but the membership in 1974 and 1984 was 23% of the teachers reporting each time. The School Science and Mathematics Association (SSMC) had a few members and the Central Association of Science and Mathematics Teachers (CAS&MT) merged with (SSMC).

One must keep in mind, though, that the 61% or 669 West Virginia secondary mathematics teachers who returned the 1984 questionnaire were probably the individuals who are also most likely to participate in professional organizations.

Professional Journals

Another indication of possible teacher quality is the type and amount of professional reading which teachers do. Table 25 reports the journal, frequency and percent of teachers who regularly read at least one article in each issue of a journal. The professional mathematics teacher journals, THE MATHEMATICS TEACHERS and THE ARITHMETIC TEACHER, are regularly read by 31.7% and 20.5% respectively. Since membership in the NCTM in 1984 was reported at 17.9%, it appears that teachers are using professional publications from the school libraries or other teachers. This is positive evidence of teacher interest in professional information.

The category of "Other" is further clarified by Table 26. In addition to the general professional journals and magazines, there appears to be an interest in journals related to computers as reported by 6.7%. This is a logical interest, but also may be related to the impending shortage of secondary mathematics teachers as the teachers are assigned computer literacy classes instead of the mathematics classes in many cases.

The type of professional reading is also of interest in considering the characteristics of teachers. Table 27 reports the number and percent

TABLE 24

D. PROFESSIONAL ORGANIZATION MEMBERSHIP

	1964		1974		1984	
	No.	%	No.	%	No.	%
WVEA	790	87.9	587	66.9	452	67.6
NEA	751	83.5	616	70.2	430	64.3
NCTM	179	19.9	198	22.6	120	17.9
WVCTM	----	----	204	23.2	155	23.2
SSMC	----	----	----	----	4	.6
CAS & MT	12	1.3	----	----	----	----
TOTAL	899		877		669	

TABLE 25

K. PROFESSIONAL JOURNALS/MAGAZINES (1984)

1. Regularly Read (at least one article/issue)

Journal	No.	%[1]
School Science & Mathematics	28	4.2
Mathematics Association of America Journal	12	1.8
The Arithmetic Teacher	137	20.5
The Mathematics Teacher	212	31.7
Journal for Research in Mathematics Education	17	2.5
The Instructor	87	13.0
Todays Education (NEA)	12	1.8
Other	65	9.7

1. The per cent calculation is based on the total of 669 responses.

TABLE 26

K. PROFESSIONAL JOURNALS/MAGAZINES (1984)

1. a. Other/Regularly Read

Journal	No.	%[1]
Learning	7	1.0
Kappan	6	.9
Scientific American	4	.5
Science Digest	3	.4
Computer Related Journals (15 Different Journals)	45	6.7

1. The per cent calculation is based on the total of 669 responses.

TABLE 27

K. PROFESSIONAL JOURNALS/MAGAZINES (1984)

2. Type usually chosen

Type	No.	%[1]
Research Related	68	10.2
Methods of Teaching Mathematics	427	63.8
Mathematical Concepts	197	29.4

1. The per cent calculation is based on the total 669 responses.

who reported the type of reading usually chosen in 1984. Most teachers (over 60%) reported choosing "Methods of Teaching Mathematics" with a smaller number choosing "Mathematical Concepts" and a few choosing "Research Related" journals. This appears to be a good arrangement for practicing secondary school teachers. The methods related articles help the teachers to remain current in their teaching techniques, while the mathematical content articles assist in keeping current what they teach.

VII. MICROCOMPUTERS IN WEST VIRGINIA SCHOOLS

A series of questions on the availability and use of microcomputers was included in the 1984 survey of all secondary mathematics teachers in West Virginia. Since this section was a new part of the survey and was not on the 1964 and 1974 surveys, the interpretation must consider that responses reflect the way the mathematics teachers interpreted the questions and have not had the benefit of previous survey use. The following are results of the survey.

It must also be noted that since schools have more than one secondary mathematics teacher, one must consider that a number of teachers in a school may have responded, while another school with different microcomputer hardware may have been in the no response group.

Microcomputer Use

The first of the microcomputer section of the survey question was "Are microcomputers used in instruction in your school?" Of the 669 responses, 83 (12%) said, "No", 579 (86%) said, "Yes", and 8 (1%) ommitted the item. The 86% who used computers in instruction were asked to check items in a list of how the microcomputers were used. More than one choice was possible. The following tabulations indicate the responses:

437 (65%)	to teach programming
263 (39%)	as a tutor for students
39 (6%)	as a course manager
170 (25)	as a record keeper
386 (58%)	to teach "computer and society" literacy
63 (9%)	other (specify)

Of those who responded to the "other" category, the following were listed:

13	Enrichment and Gifted
8	Word Processing
4	Business and Accounting
6	Science Classes
4	Advanced Math Classes
4	Remediation (Basic Skills)
1	Newspaper Staff
2	Career Guidance
3	Scheduling
1	Achievement Monitoring
1	Behavior Modification
2	Record Keeping and Administration
4	Motivation
3	Concept Development
2	Data Processing
2	Computer Familiarity
1	Video Games

These responses appear to indicate that uses other than programming and computer literacy are well kept secrets. Very few uses, such as school newspaper, word processing, course management, or remediation were reported. This conclusion may be tempered by the phrasing of the question. Mathematics teachers were asked if microcomputers were used in INSTRUCTION. Thus the teachers may not have felt that non-instructional uses were to be listed.

Microcomputer Hardware

The last questions on the survey concerned the frequency and brands of microcomputers in use in their school. They were asked how many and the kind of computer hardware in use.

The total number of each kind of microcomputers reported by the secondary mathematics teachers in the 1984 survey is shown below:

NO.	BRAND
2405	Apple
1525	Radio Shack
1235	Atari
1173	IBM
1155	Commodore
118	Texas Instruments
327	Other

These totals in 1984 indicate that the number of Apples in use was about double the number of each of the other major brands, Atari, Radio Shack, Commodore, and IBM. These frequencies do show, though, that there are a large number of microcomputers in use in West Virginia Schools. Note that this table does not count the number of computers in the state since mathematics teachers in the same school may have counted their computers more than once. Other machines listed were the Osborne, Franklin, P.C. Eagle, Digital, Rainbow, Timex Sinclair, Ohio Scientific, Pet, VIC, NEC, Epson, and Monroe. Only the Franklin (11) and the Timex Sinclair (10) were indicated by ten or more respondents.

The teachers reported having either one or two of a computer brand, or else having enough for classroom use, for example 10 or 15. The single computers may be the odd brand that is included in a classroom to provide experience with a different kind. One school reported 220 of one brand of computers.

The survey of secondary mathematics teachers indicated that the Apple Computers are most widely used and that the greatest instructional use is teaching programming and computer literacy. The use of microcomputers appears to be rapidly changing in West Virginia schools.

VIII. OBSERVATIONS AND COMMENTS

The comparisons of the data over the twenty year period indicate that the current secondary school mathematics teachers are well educated and trained with almost all holding the Baccalaurate Degree and 54% holding the Master's Degree. They have completed in-service activities and continue to study. The mathematics teachers are experienced teachers who have been teaching for about twelve years. Over 80% of them indicate that they plan to teach for five more years, but the low number of beginning teachers coupled with the higher number of teachers who will be moving toward retirement fortells of a serious mathematics teacher shortage in West Virginia in the 1990's. This could come earlier if a large number of them should leave the state. Based on the results of this survey, it appears that West Virginia has a few short years to take measures to blunt the secondary mathematics teacher shortage that will occur in the 1990's if conditions remain as they are. Hopefully, this information may encourage actions that will increase the number of new secondary mathematics teachers and retain the current mathematics teachers.

The survey indicates that most teachers are satisfied with teaching mathematics rather than some other subject, but many indicated that they would prefer to teach mathematics courses at a higher or pre-college level.

The beginning of this report referred to quality and quantity of mathematics teachers. This survey and the comparisons over the twenty year period show that items indicating quality have been improving, but quantity items point to a serious secondary mathematics teacher shortage in the future of West Virginia.

The study points to the teacher shortage but does not speak for solutions to the problem of quantity of mathematics teachers. Other sources are suggesting activities such as: (Wise, 1986 pp. 650-652)

1. Loans to students preparing to be mathematics teachers and are cancelled by years of mathematics teaching.
2. Differential pay for mathematics teachers.
3. Bonuses for mathematics teachers to begin teaching.
4. Differential pay for teachers of different mathematics teaching levels. (More pay for general mathematics teachers since it is usually more taxing work).
5. Using more part-time teachers from other professions and industry.
6. Encouraging students to complete Liberal Arts Programs and then train to be teachers at the graduate level with internships.
7. Opportunities for math teachers to teach other math courses.
8. Salaries competative with other states.
9. Enticing teachers who have left mathematics teaching to return.
10. Make the teaching environment more appealing to teachers.

The look at characteristics of secondary mathematics teachers in West

Virginia over the twenty year period is encouraging when considering the efforts to improve instruction. However, the future supply of high quality secondary mathematics teachers is a very black cloud over the future of mathematics instruction in West Virginia.

REFERENCES

Haberman, Martin. (1986, June) "Licensing Teachers: Lessons From Other Professions." PHI DELTA KAPPAN, 67(10). pg. 719-722.

Hatfield, Steven H. (1974). PREPARATION OF THE MATHEMATICS TEACHERS IN THE PUBLIC SECONDARY SCHOOLS OF WEST VIRGINIA (Doctoral Dissertation, West Virginia University). University Microfilms International, No. 75-121381.

Hawley, Willis D. (1986, June) "Toward a Comprehensive Strategy for Addressing The Teacher Shortage." PHI DELTA KAPPAN, 67(10). pp. 712-718.

House, Peggy. (1982) "Mathematics Teachers: An Endangered Species." MATHEMATICS EDUCATION INFORMATION REPORT. ERIC Charinghouse for Science, Mathematics and Environmental Education, The Ohio State University, Columbus, Ohio. (Monograph, 117 pages).

Kottkamp, Robert B., Provenzo, Eugene F. Jr., and Cohn, Marilyn M. (1986, April) "Stability and Change in a Profession: Two Decades of Teacher Attitudes, 1964-1984." PHI DELTA KAPPAN, 67(8), pp. 559-567.

Lortie, Dan C. (1975) SCHOOLTEACHER: A SOCIOLOGICAL STUDY. Chicago: University of Chicago Press.

McGeever, James M.(1984) "State and Local Initiatives to Alleviate Teacher Shortages in Mathematics and Science." OCCASIONAL PAPER SERIES, Appalachia Educational Laboratory, Charleston, West Virginia (Monograph, 39 pages).

National Commission on Excellence in Education. (1983) A NATION AT RISK: THE IMPERATIVE FOR EDUCATIONAL REFORM. Washington, D.C.: U.S. Department of Education.

National Science Board Commission on Precollege Education in Mathematics, Science and Technology, National Science Foundation (1983). EDUCATING AMERICANS FOR THE 21st CENTURY: REPORT, Washington, D.C.

Pollak, Henry O. (1982) "The Mathematical Sciences Curriculum K-12: What Is Still Fundamental and What Is Not," EDUCATING AMERICANS FOR THE 21st CENTURY: SOURCE MATERIALS, National Science Foundation, Washington D.C. pp. 1-17.

Regula, Walter E. (1965). PREPARATION OF THE MATHEMATICS TEACHERS IN THE PUBLIC SECONDARY SCHOOLS OF WEST VIRGINIA. (Doctoral Dissertation, The Ohio State University). University Microfilms International No. 65-9371.

Roth, Robert A. (1986, June) "Emergency Certificates, Misassignment of Teachers, and Other 'Dirty Little Secrets'", PHI DELTA KAPPAN, 67(10), pg. 725-727.

Watts, Gary D. (1986 June) "And Let the Air Out Of the Volleyballs", PHI DELTA KAPPAN, 67(10), pg. 723-724.

Wise, Arthur E. (1986, May) "Three Scenarios for The Future of Teaching." PHI DELTA KAPPAN 67(9) pp. 649-652.

APPENDIX - Survey Packet

State of West Virginia
Department of Education
Charleston
25305

ROY TRUBY
STATE SUPERINTENDENT
OF SCHOOLS

M E M O R A N D U M

TO: WV Math Teachers

FROM: Robert E. Gabrys, Director
Educational Personnel Development

RE: Enclosed Survey

DATE: April 9, 1984

In an effort to identify information related to supply and demand as well as meaningful staff development opportunities for mathematics teachers, we are participating in the survey being conducted by Dr. Boyd Holtan of West Virginia University.

The study is significant in terms of its updating previous information concerning West Virginia mathematics teachers. I urge you to take the time to complete the questions.

Rest assured that this is not just another survey - the results will be used. Thank you in advance for your support.

REG:ajs:S/9

Enclosure

West Virginia University

Division of Education
304 293-3441/3442

College of Human Resources and Education
602-604 Allen Hall
P.O. Box 6122
Morgantown, WV 26506-6122

Dear West Virginia Mathematics Teacher:

In 1963, the late Professor Walter Regula of Marshall University surveyed the educational preparation of West Virginia secondary mathematics teachers as part of his doctoral dissertation at The Ohio State University. In 1973, Dr. Steven Hatfield, now of Marshall University, repeated the survey as a part of his doctoral dissertation at West Virginia University. I am asking for your cooperation to extend the data collection for the last ten year period to look for trends and relationships.

Please complete the enclosed questionnaire, fold it in half, with the return address showing, staple it and drop it in the mail. No postage is necessary. The West Virginia State Department of Education is assisting in the return mailing. The questionnaires will be returned to them, and they will deliver them all to me for the analysis.

Of course, the participation is voluntary and participants' names will be kept anonymous. A code number will be assigned to allow us follow-up on those that are not returned from the first mailing, and the assignments will be destroyed when the collection is completed. You do not have to answer every question if you have concern about an item, and your responses will not be released to your employers.

Please help to extend an opportunity for a longitudinal study of mathematics teachers in West Virginia.

Sincerely,

Boyd Holtan

Boyd Holtan
Professor of Education
Mathematics Education

QUESTIONNAIRE FOR MATHEMATICS TEACHERS

Code number:

General Directions: Please answer each item in the best way you can either by checking, encircling the appropriate suggested response or by supplying the information requested. You will be able to complete this questionnaire in about 15 minutes.

A. Teaching Experience. Please do not include the present school year. (Encircle the appropriate response.)

1. Total years of experience: none 1 2 3 4 5 6 7 8 9 10 11-15 16-20 over 20

2. Years you have taught in the school where you are now teaching: none 1 2 3 4 5 6 7 8 9 10 11-15 16-20 over 20

3. Years you have taught mathematics in grades 7 through 12: none 1 2 3 4 5 6 7 8 9 10 11-15 16-20 over 20

B. Teaching Level. (Indicate your major assignment level)

_____ Elementary

_____ Middle School

_____ Junior High School

_____ High School

C. Certification. (Place a check mark in each rectangle which indicates a type of West Virginia certificate or teaching permit you now hold.)

Name or type	Valid in Grades 1-9	1-12	7-12
One-year Permit			
Provisional Professional (3 year)			
Professional (5 year)			
Professional Permanent			
Administrative			

D. Membership in Professional Organizations.
(Check when listed; otherwise supply names.)

____a. West Virginia Education Association
____b. National Education Association
____c. National Council of Teachers of Mathematics
____d. Central Association of Science and Mathematics Teachers
____e. West Virginia Council of Teachers of Mathematics
____f. School Science and Mathematics Assn.
____g. Others (Specify) _____
_____

E. Degrees. (Please list all degrees earned, e.g., B.A., B.S., M.A., M.S.)

Degree	Awarding Institution	Year	Major	Minor

F. Work Beyond Highest Degree.

1. Have you taken any college courses since receiving the highest degree reported above?
____a. Yes ____b. No

2. How many credit hours have you completed since receiving your highest or latest degree?
_____

3. In what area or areas has this work been done?
_____

4. Does this work apply toward the requirements for another degree?
____a. Yes ____b. No

If your answer is "Yes", what degree is it?
_____

What is your major area?_____

G. In-service Training in Mathematics and in Mathematics Education.

1. Have you ever applied for participation in a National Science Foundation or other sponsored summer or academic year program for high school mathematics teachers?
____a. Yes ____b. No

2. Have you attended a sponsored summer or academic year program for teachers of mathematics?
____a. Yes ____b. No

3. Have you taken any in-service course or attended a workshop for mathematics teachers during the past five years?
____a. Yes ____b. No If "yes", identify it._____

4. Is it required that you earn additional college credit in the next five years in order to continue the validity of your certificate?
____a. Yes ____b. No

5. Are you planning to earn additional credit in mathematics or in mathematics education in the next five years?
____a. Yes ____b. No

H. Teaching Preference.

1. Would you rather teach some other subject, or subjects than mathematics?
____a. Yes ____b. No

2. Do you plan to continue to teach mathematics for at least five more years?
____a. Yes ____b. No

3. Would you prefer to teach another mathematics course that you are not now teaching?
____a. Yes ____b. No If "yes", name it or them_____
_____

I. Experimental Program.

1. Place a check mark in each appropriate space of the chart below.

Experimental Program	I am familiar with this program	I am using this program in some of my math classes
School Mathematics Study Group (SMSG)		
University of Illinois Committee on School Mathematics (UICSM)		
University of Maryland Mathematics Program (UMMaP)		
Encyclopedia Brittanica Programmed Material (TEMAC)		
Ball State Teachers College Program		
Boston College Mathematical Series Co-op Unit Study Program (CUSP)		
Columbia University Project		
Comprehensive School Mathematics Program (CEMREL)		
Systematic Teaching and Measuring Mathematics (STAMM)		
Others (specify)		

2. If you are using any of the above experimental material, have you had any preparatory training in the teaching of this material?

____a. Yes ____b. No

3. If your answer to item 2 is "Yes", indicate the type of training you have had.

____a. NSF summer or academic year course or seminar

____b. Regular college course

____c. In-service workshop

____d. Institution-sponsored training program

____e. Others (specify)_____

_____

J. Mathematics Education.

1. Have you taken a mathematics methods course?

____a. Yes ____b. No

If your answer is "Yes", answer item 2.

2. Who taught the mathematics course?

____a. Mathematics Department

____b. Education Department

3. Number of semester hours in mathematics education: (Encircle the appropriate response.)

none 1 2 3 4 5 6 7 8 9 10 11-15 16-20 over 20

K. Professional Journals/Magazines

1. Which of the following professional journals do you regularly read? (at least one article per issue)

____ School Science and Mathematics

____ Mathematics Association of America Journal

____ The Arithmetic Teacher

____ The Mathematics Teacher

____ Journal for Research in Mathematics Education

____ Instructor

____ Others, please list_____

_____

2. When choosing professional reading articles, which do you usually choose?

____ research related

____ methods of teaching mathematics

____ mathematical concepts

L. Microcomputer Use

1. Are microcomputers used in instruction in your school?

____ Yes ___ No

2. If "Yes" above, how are the microcomputers used?
(Check as many as apply)

____ to teach programming

____ as a tutor for students

____ as a course manager

____ as a record keeper

____ to teach "computer and society" literacy

____ other (specify)_____

3. How many of each make of microcomputers does your school use?

How Many	Kind
_____	Atari
_____	Apple
_____	Radio Shack
_____	Commodore
_____	IBM
_____	Texas Instruments
_____	Other (What Kind?) _____

No Postage
Necessary
If Mailed
in the
United States

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 1658 CHARLESTON, WV

POSTAGE WILL BE PAID BY ADDRESSEE

WEST VIRGINIA DEPARTMENT OF EDUCATION

ATTENTION: Robert E. Gabrys

Bldg. 6, Room B-304

Charleston, West Virginia 25305

West Virginia University

Dr. Boyd Holtan
Math Teacher Survey
Division of Education
College of Human Resources and Education
604 Allen Hall - P. O. Box 6122
Morgantown, WV 26506-6122

Nonprofit Organization
U.S. Postage
PAID
Morgantown, W. Va.
Permit No. 34